



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Reissue Patent Application of

JOHANSSON et al.

Atty. Ref.: 1585-280

Serial No. 09/659,377

Group: 3641

Filed: September 7, 2000

Examiner: Behrend

(Merged with Reexamination Control No.  
90/005,098, filed Sept. 3, 1998)

33/B  
8/6/03  
Holmes

For: OPTIMIZED CRITICAL POWER IN A FUEL BUNDLE WITH PART LENGTH RODS

\* \* \* \* \*

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

May 27, 2003  
**RECEIVED**  
JUN 02 2003  
**GROUP 3600**

**LETTER**


Attached are two copies of a response to an Official Action dated February 25, 2003 in the above identified Reissue application (now merged with Reexamination Control No. 90/005,098, as required by Section 2285 of the MPEP.

Applicants understand that one copy will be placed in each file.

Respectfully submitted,

**NIXON & VANDERHYE P.C.**

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#33  
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For: OPTIMIZED CRITICAL POWER IN A FUEL BUNDLE WITH PART LENGTH  
RODS

\* \* \* \* \*

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**AMENDMENT**

Responsive to the Official Action dated February 25, 2003, please amend the  
above-identified Reissue application as follows:

**IN THE SPECIFICATION**

Column 10, line 65, please amend the paragraph as follows:

The reader will realize that in this latter design, decreasing spacer pitch occurs at  
that portion of the fuel bundle wherein the void fraction increases. In the above described  
embodiments, a single length for the partial length rods P has been specified for each  
bundle. Alternatively, all of the partial length rods within a bundle may have different

*B1*  
lengths. See, for example the representative various lengths of the partial length rods in FIGS. 3B-3F.

### IN THE CLAIMS

Please amend claim 108 as follows:

108. In a boiling water reactor having discrete bundles of fuel rods confined within channel enclosed fuel assemblies wherein said fuel bundle includes:

*B2*  
a plurality of fuel rods for placement within said channel, each said fuel rod containing fissile material for producing a nuclear reaction when in the presence of sufficient moderating water coolant and moderated neutrons;

a lower tie plate for supporting said bundle of fuel rods within said channel, said lower tie plate joining the bottom of said channel to close the bottom end of said channel, said lower tie plate providing defined apertures for the inflow of water coolant in said channel between said fuel rods for generation of steam during said nuclear reaction;

said plurality of fuel rods extending from said lower tie plate wherein a single phase region of said water in said bundle is defined to an upward portion of said bundle wherein an upper annular flow regime of said water and steam in said bundle is defined during said nuclear reaction in said fuel bundle;

an upper tie plate for supporting the upper end of said bundle of fuel rods, said upper tie plate joining the top of said channel, said upper tie plate providing apertures for the outflow of water and generated steam in said channel during said nuclear reaction;

spacers, each defining a matrix of individual fuel rod cells, located intermediate said upper and lower tie plates at preselected elevations along said fuel rods for maintaining said fuel rods in spaced apart location along the length of said fuel assembly including a first group of spacers in said single phase region of said fuel bundle and a second group of spacers in said upper annular flow regime of said fuel bundle;

a portion of said plurality of fuel rods being part length fuel rods extending from said lower tie plate towards said upper tie plate, said part length fuel rods terminating at ends within said upper annular flow regime of said fuel bundle before reaching said upper tie plate and causing decreased pressure drop in said upper annular flow regime of said fuel bundle during said nuclear reaction;

the improvement to said bundle comprising:

means associated with at least some of said second group of spacers in said upper annular flow regime of said fuel bundle for restoring at least some of the decreased pressure drop realized by said part length fuel rods whereby improved critical power performance is achieved at said fuel bundle having said part length fuel rods, said means including an additional spacer in said upper annular flow regime sufficient to decrease spacer pitch in said upper annular flow regime as compared to spacer pitch in said single phase region of said fuel bundle.

**REMARKS**

Reconsideration and withdrawal of the outstanding grounds of rejection are respectfully requested in light of the above amendments and the remarks that follow.

The Examiner has rejected claims 15, 16, 20, 35-44, 107 and 109 under 35 U.S.C. 112, first paragraph as containing subject matter not described in the specification in such a way as to reasonably convey to one skilled in the art at the time that the application was filed, that applicants had possession of the claimed invention. Specifically, the Examiner contends that there is no support in the original disclosure for reciting that the means for restoring pressure drop is positioned adjacent just one part length fuel rod. The Examiner also contends there is a similar lack of support for stating that the means for restoring pressure drop is located in the "interstitial volumes between fuel rod cells," noting that the specification refers instead to the interstitial volumes between fuel rods.

The Examiner has apparently overlooked applicant's second preliminary amendment of April 8, 2002 that corresponds to an amendment dated January 4, 2002 in Reexamination No. 90/005,098 now merged with this Reissue. In the amendment of April 8, 2002, independent claim 15 was amended to remove reference to the means for restoring pressure drop being positioned adjacent just one part length fuel rod, and to also amend the reference to "interstitial volumes between fuel rod cells" so as to read "interstitial volumes between said fuel rods." Thus, claim 15 now requires "means located in interstitial volumes between said fuel rods in at least some of said second group of spacers containing part length fuel rods in said upper annular flow regime...".

Support for the language in claim 15 is found in Column 2, lines 23-28 and Column 5, lines 2-4. While the description in Column 2 appears in the "Background" section, it is readily apparent from the text and drawings that this description applies equally as well to the spacers that form part of the claimed invention concerning improvements or additional structure applied to the common matrix of fuel rod containing cells.

Additional support is found in Column 9, lines 26-60; Column 10, lines 9-48; Column 11, lines 3-57; and drawing Figures 2A-2D; 3B-3F; 4B, C; 5B, C; 6B, C and 7C, D.

Independent claim 35 was similarly amended, but retains language relating to spacers in the upper annular flow regime including at locations other than above the part length rods. Support for the latter limitation is clearly provided in the specification and drawings as filed. The Section 112, first paragraph ground of rejection applied against claims 15, 16, 20, 35-44, 107 and 109 has therefore been overcome and, in this regard, please note that claims 16, 20, 107 and 109 depend from claim 15 and that claims 36-44 depend from claim 35.

The Examiner has also rejected claims 15, 16, 20, 35-44, 107 and 109 under 35 U.S.C. 251 as being based upon new matter. The "new matter" according to the Examiner relates to the same limitations discussed hereinabove with respect to the Section 112, first paragraph rejection.

Here again, independent claims 15 and 35 have been previously amended to delete the language objected to by the Examiner. The claims as amended do not contain any new matter, and reference is made to the areas of support identified above.

The Examiner has also rejected claims 15, 16, 20, 35-44, 107 and 109 under 35 U.S.C. 251 as being broadened in a reissue application filed outside the two year statutory period. According to the Examiner, reciting that the means for restoring pressure drop is positioned adjacent just one part length fuel rod broadens the claims; that reciting spacers from the second group of spacers can be at locations other than above the part length rod broadens the claims; and that, with regard to claim 108, reciting the presence of "an additional spacer" without positively and specifically reciting the difference in vertical distribution between the spacers of the second group as compared to the vertical distribution between the spacers of the first group also results in a broader claim.

With regard to claims 15 and 35, the recitation relating to restoring pressure drop positioned adjacent just one part length fuel rod was previously deleted as discussed hereinabove.

With further regard to claim 35, it is not understood how the Examiner can take the position that by reciting that at least some of the second group of spacers in the upper annular flow regime are positioned at locations other than above the part length rods, broadens the claim. Clearly, absent the language at issue, the claim would embrace a configuration where the second group of spacers are located in the upper annular flow regime and above the part length rods, below the part length rods (but still in the upper annular flow regime) or a combination of the two. By adding language requiring some of the second group of spacers be positioned at locations other than above the part length

rods, a positive additional structural requirement is added to the claim. In other words, in order to infringe claim 35, it is necessary that at least some of the second group of spacers be located in the upper annular flow regime of the bundle, at or below the tops of the part length fuel rods. Thus, claim 35 would no longer embrace a configuration where all of the second group of spacers are located in the upper annular flow regime and above the part length fuel rods as embraced by original patent claim 35. Clearly, claim 35 has been narrowed, not broadened.

With regard to the argument relating to new claim 108, that claim has been amended to positively require that the additional spacer be sufficient to decrease the pitch in the upper region of the bundle, thereby overcoming the rejection.

The Examiner has rejected claims 15, 16, 20, 35-44, and 107-109 under 35 U.S.C. 251 as being improperly broadened and a reissue application made and sworn to by the assignee and not the patentee.

The rejection here follows from the rejection based on broadened reissue claims discussed hereinabove, and the arguments are equally applicable here. It is respectfully submitted that the rejection should now be withdrawn.

Prior to discussing the various prior art grounds of rejection in detail, it may be helpful to review the background of the invention, and the specific problem that is addressed by this invention. As the Examiner may recall, U.S. Patent 5,112,570 discloses the incorporation of part length fuel rods in a fuel bundle in a boiling water nuclear reactor. The '570 patent had for one of its principal purposes, optimization of fuel bundle

design for fuel cycle economics, while maintaining good marginal thermal stability and cold shutdown limits. It was, of course, well known that as coolant is forced upwardly through the fuel bundle, there is a pressure drop, part of which occurs at the bottom non-boiling portion of the reactor, and the remaining portion of which occurs in the upper boiling portion of the fuel bundle. The upper portion is often referred to as the two phase region, or (in this application) the upper annular flow regime. The '570 patent discloses that by reducing the pressure drop in a two phase region relative to the single phase region, the tendencies for thermo-hydraulic instability and coupled nuclear thermo-hydraulic instabilities can be reduced. To this end, the '570 patent introduced the concept of part length fuel rods that extend from the bottom of the channel within the boiling region only partway to the top of the channel. Specifically, the part length rods terminate at a spacer that is located in the two phase flow region of the fuel assembly. It was believed that the total pressure drop and the pressure drop in the two phase region of the bundle were reduced without substantial corresponding degradation of the fuel assembly's thermal limits (see column 5). In fact, in column 7, the '570 patent discloses that since the part length rods are located so as to shorten the full length rods that would otherwise be limiting the power output of the fuel bundle, and since transition boiling limits occurs in the top of the fuel assembly, the utilization of part length rods increases allowable maximum bundle power. Thus, while the ratio of single phase pressure drop to two phase pressure drop is reduced, it was thought at the time that thermal margins of the fuel bundle were preserved.

The applicants in this invention discovered, to the contrary, that a fuel bundle incorporating part length rods has a tendency to have reduced critical power limitations in the upper two phase region of the fuel bundle. See especially the disclosure in Columns 4 and 5 under the headings "Discovery" and "Summary of the Invention."

This invention seeks to solve the newly discovered problem of reduced critical power by utilizing spacers and/or attached spacer devices that tend to restore or add back some of the pressure drop created by the utilization of part length fuel rods, and thereby achieve "serendipitous improved critical power performance in the upper two phase region of the fuel assembly" (Column 4, lines 42-45).

Leaving the Japan '986 reference aside for the moment, the Examiner will appreciate that one of ordinary skill in the art would not have found it obvious to utilize spacers with swirl vanes in the interstitial volumes between the fuel rod containing cells of the spacer, or to decrease the pitch of the spacers in the upper two phase region, because the '570 patent provided no reason for any such modification. In other words, since the '570 patent teaches that thermal margins are preserved even when part length fuel rods are incorporated into the fuel bundle, there would have been no reason to then modify the spacer configuration to restore some of the pressure loss created by the use of the part length rods.

In the Japan '986 reference, it is recognized that in fuel bundles with short length rods, there is no heat generation in the vacated areas (because of the lack of fuel above the termination points of the part length fuel rods), and a widened coolant flow path is

created. It is stated in the '986 reference that because coolant flow rate and steam weight percentage distribution in the fuel assembly are uneven and distorted, a reduced thermal margin results. The '986 reference, however, proposes a different solution than that of the applicants. Specifically, the '986 patent seeks to provide improved thermal margin with respect to boiling transition by decreasing the flow rate directly above the part length fuel rods in order to increase the flow rate around the full length rods. The '986 patent achieves this goal in two ways. In a first embodiment, the round cell spacer grid portions occupying the position of part length fuel rods in spacers above the part length rods are provided with a relatively large wall thickness and downwardly directed projections. In a second embodiment, circular coolant flow obstacles 23 are mounted in square spacer grids above the part length fuel rods.

The Examiner has now rejected claims 15, 16, 107 and 109 under 35 U.S.C. 102(b) as anticipated by Japan '986. According to the Examiner, the claimed means for restoring at least some of the decreased pressure drop reads on the thicker spacer grid as well as on the vanes, for example, vane 20 in Figure 6, that is not directly above the part length rod.

It is respectfully submitted that the '986 patent does not provide response for claim 15 as amended. Note, for example, that claim 15 requires the means to be located in interstitial volumes between the fuel rods in at least some of the second group of spacers containing part length fuel rods in the upper annular flow regime of the flow bundle. In the '986 patent, and especially in Figure 6b relied upon by the Examiner, it is apparent

that the spacer from which projection 20 depends is located axially above the part length rod 21. This is contrary to the claimed arrangement where the required means is located in interstitial volumes between the fuel rods in at least some of the second group of spacers containing part length fuel rods. In other words, there is no disclosure or suggestion that the projection 20 is located in an interstitial volume between fuel rods, nor that the spacer that incorporates the projection 20 also contains part length fuel rods. Accordingly, there can be no anticipation of independent claim 15 or claim 16 which depends therefrom.

With regard to dependent claim 107, that claim requires a plurality of the second group of spacers in the upper annular flow regime to include swirl vanes at locations other than above the part length rods in the interstitial volumes between the fuel rod cells and adjacent one or more of the part length rods. In the '986 patent, there is no disclosure or suggestion that the projection 20 is a swirl vane and in any event, the projection 20 does not lie in an interstitial volume between fuel rods in spacers containing part length rods. Accordingly, Japan '986 does not anticipate the subject matter of claim 107.

Claim 109 is also dependent on claim 15 and is not only patentable in its own right, but also by reason of its dependence upon claim 15 for the reasons presented above.

Finally, with regard to the Examiner's functional inherency argument, for the reasons stated above, the structure in the prior art is not the same as claimed here and, therefore, the inherency argument is inapt.

The Examiner has rejected claims 15, 16, 20 and 22-44 as well as claims 107-109 under 35 U.S.C. 103 as unpatentable over Japan '986 in view of Leclercq. The Examiner concludes that it would have been obvious to one of ordinary skill in the art to modify the Japan '986 reference by having vanes at each of the interstices of the upper grids or even thicker upper grids, or decreased spacing between the upper grids as shown to be old by the secondary reference to Leclercq.

The discussion above of Japan '986 is equally applicable here. It is respectfully submitted that the Examiner's reliance on the secondary reference to Leclercq not only does nothing to remedy the deficiencies of Japan '986, but the combination is improper in any event since there is no suggestion whatsoever in Leclercq that the construction therein is applicable to Japan '986. For example, Leclercq relates to fuel bundles and pressurized water reactors, not boiling water nuclear reactors as disclosed in Japan '986. Moreover, there is no disclosure of any kind in Leclercq with respect to utilizing part length fuel rods in the fuel bundle. While Leclercq does disclose the use of flat fins 40 in the interstices of the spacer grids. Note that Leclercq's fins are designed to produce turbulence in the coolant flow along the fuel rod assembly, and only in the middle portion of the assembly. Absent any teaching or suggestion of the impact that such fins might have on part length rods in an upper two-phase region of the bundle, one of ordinary skill in the art would have found no guidance in Leclercq concerning any modification of Japan '986 that would otherwise produce the claimed invention.

Claims 16 and 20 depend from claim 15 and are patentable for the reasons presented above, but also since neither of the references relied upon by the Examiner disclose the specific subject matter of these claims. Note that flat fins or projections as disclosed in the references are not "swirl vanes" as that term is understood in the art.

With respect to independent claims 22 and 28, Leclercq's teaching of decreasing the spacing between spacers in the upper region of the bundle would not have been adopted by one of ordinary skill in the art since to do so would not achieve the objective of the '986 patent, i.e., to reduce flow rate directly above the part length fuel rods and to increase flow rate around the full length rods. Moreover, Leclercq suggests nothing with respect to why one of ordinary skill in the art would want to decrease the spacing between the spacers in the upper two phase region in fuel bundles incorporating part length rods in that region (Leclercq does not utilize part length rods). In other words, absent hindsight, one of ordinary skill in the art would not have found it obvious to combine these two references in any such way as to meet the requirements of independent claims 22 and 28.

Claims 22-27 depend from claim 22 and are patentable along therewith. Claim 24 is also patentable in its own right.

Claims 29-34 depend from claim 28 and are patentable along therewith. In addition, neither reference discloses or suggests the subject matter of claim 30. The Examiner's unsupported conclusion of obviousness is improper.

Claims 36-44 depend from claim 35 and are patentable along therewith. Here again, the Examiner's unsupported obviousness argument as relating to claims 38-40 and 42-44 is improper.

The arguments above concerning Japan '986 and Leclercq apply equally as well to dependent claims 107 and 109 as well as independent claim 108. Concerning the latter, it is not apparent why one of ordinary skill in the art would adopt Leclercq's reduced spacing feature for use in Japan '986. This modification would not achieve the objective(s) of the '986 patent, and the combination is thus clearly based on the use of impermissible hindsight. With regard to dependent claim 107, the Examiner apparently acknowledges that the references do not suggest "swirl vanes" but takes the position that the use of vanes formed of twisted elements for imparting a swirl to the coolant are conventionally known alternatives and hence, prima facie obvious. What the Examiner does not address is why it would have been obvious to use such swirl vanes in the specific locations recited in the independent claims, in combination with part length fuel rods. For reasons already presented, it is respectfully submitted that the prior art does not provide evidence sufficient to establish prima facie obviousness. The Examiner argues that Leclercq is cited merely for showing various expedients well known to be old and advantageous in the nuclear reactor fuel assembly art asserting that "these advantages remain irregardless (sic) of whether the fuel assembly is utilized in a PWR or a BWR and, whether or not the fuel assembly includes part length fuel rods....". Again, what the Examiner is failing to take into account is the lack of any reasons presented in the

references for making the proposed combination. It is simply erroneous to assert that because a particular element might be known in the prior art, that it would have been obvious to utilize that known prior element in any structural arrangement in that art. Here, the applicant is making use of claimed structure in the context of a problem of reduced critical power by utilizing spacers and/or attached spacer devices that tend to restore or add back some of the pressure drop created by the utilization of part length fuel rods, and thereby achieve improved critical power performance in the upper two phase region of the fuel assembly.

For all of the above reasons, it is respectfully submitted that the rejection of claims 15, 16, 20, 22-44 and 107-109 as unpatentable over Japan '986 in view of Leclercq is improper and should be withdrawn.

The Examiner has rejected claims 15, 16, 20, 22-44 and 107-109 under 35 U.S.C. 103 as unpatentable over Japan '986 in view of Leclercq and further in view of any of Thomazet (4,804,516), Japan '690, Japan '592, Japan '493 or Japan '388.

As previously argued, Thomazet does not expressly state that the invention is suitable for boiling water reactors and moreover, neither Thomazet nor Leclercq disclose fuel bundles that incorporate part length rods and neither appreciates nor discusses the impact of decreased spacing in the upper two phase region of the fuel bundles that incorporate part length fuel rods. More importantly, the application of the teaching of Thomazet, like Leclercq, would defeat the objective of the primary reference, Japan '986. Thus, it is only with the benefit of applicant's own disclosure that one of ordinary skill in

the art would have any reason to arrive at the claimed construction from the combined teaching of the references.

In addition, none of the '592, '690, '493 or '388 Japan references incorporate part length fuel rods into the bundle, and therefore, suffer the same deficiency as Leclercq and thus provide no basis for any proposed combination with Japan '986. Here again, it is important to recognize that the prior art as cited and relied upon by the Examiner does not suggest modification of the primary reference, Japan '986, in such a way as to meet the requirements of the independent claims. The only way the proposed combinations can be made is with the exercise of impermissible hindsight gained from applicant's own disclosure.

The Examiner has also rejected claims 15, 16, 20, 22-44 and 107-109 under 35 U.S.C. 103 as unpatentable over Japan '986 in view of Leclercq and further in view of any one of Orii (5,112,571), Hatfield or Buettiker.

The remarks above with respect to Japan '986 in combination with Leclercq, Thomazet, Japan '690, Japan '493 and Japan '592 are incorporated herein by reference. It is again noted that Japan '986 seeks to decrease the coolant flow rate in areas directly above the part length rods in order to increase the flow rate around the full length rods. Incorporating spacers with swirl vanes and the interstices between the rod cells in the two phase region, as suggested by the Examiner, is contrary to the objective of the '986 patent as discussed in detail above. Please also note that like Leclercq and other cited Japan references, none of Orii, Hatfield or Buettiker disclose or suggest the utilization of swirl

vanes in the upper two phase region of a fuel bundle that incorporates part length rods.

Here again, any combination of these references is necessarily based upon the utilization of impermissible hindsight.

The Examiner has rejected claim 30 under 35 U.S.C. 103 as unpatentable over Japan '986 in view of Leclercq and any of Thomazet, Japan '690, Japan '493, Japan '592 and further in view of Dix (5,017,332), Ogiya et al. (4,968,479), Wolters et al. (5,164,155) or Ueda et al. (5,068,082). Claim 30, which depends from claim 38, is patentable for all of the reasons presented above with respect to claim 28, noting that the additional references now cited by the Examiner do not remedy the deficiencies in the base combination of references. In other words, none of the secondarily applied references suggest decreased pitch of spacers in the upper two phase region of a bundle that incorporates part length fuel rods terminating in the upper region. Accordingly, the rejection of claim 30 remains improper and should be withdrawn. Here again, the Examiner is blindly asserting obviousness without taking into account the reasons and impact of the proposed modifications.

The Examiner has rejected claims 15, 16, 22-34 and 107-109 under 35 U.S.C. 103 as unpatentable over Japan '986 in view of either Japan '690 or Japan '592. According to the Examiner, it would have been obvious to modify the '986 reference by having the spacers closer together in the upper portion of the fuel bundle.

Independent claim 15 does not require decreased spacing in the upper region of the fuel bundle but rather, requires means located in interstitial volumes between the fuel

rods and at least some of the second group of spacers containing part length fuel rods.

This arrangement, as already discussed hereinabove, is nowhere disclosed or suggested in Japan '986. Moreover, since Japan '690 and Japan '592 do not disclose or suggest the utilization of part length fuel rods on a fuel bundle assembly, the combination of references is clearly improper since no reasons are apparent for making the combination. Further in this regard, the mere fact that these references suggest decreased spacing of spacers in a fuel bundle with full length rods does not establish prima facie obviousness with respect to the use of decreased spacing in all fuel bundles, and especially in fuel bundles that contain part length fuel rods as required by independent claims 22, 28 and 108. The secondary references provide no reason, rationale or guidance for the proposed modification, and thus the Examiner has not provided sufficient evidence to warrant a conclusion of prima facie obviousness with respect to these claims.

The Examiner has rejected claims 15, 16, 20 and 35-44 as well as 107 under 35 U.S.C. 103 as unpatentable over Japan '986 in view of Japan '493, alone or in view of any of Orii, Hatfield or Buettiker.

Insofar as the combination of the '986 patent with any of Orii, Hatfield or Buettiker has been discussed above, no further comment is necessary here. With respect to the Japan '493 patent, the Examiner merely asserts that the reference shows the use of flow tabs on specified grids to promote high mixing.

The '493 patent does not disclose or suggest means in the interstitial volumes between the fuel rods in at least some of the second group of spacers in the upper annular

flow regime containing part length rods, for restoring at least some of the decreased pressure drop realized by part length fuel rods. In fact, the '693 patent does not utilize part length fuel rods. It is not apparent how or why one of ordinary skill in the art would have found it obvious to modify the principal reference as proposed by the Examiner.

The ground of rejection is also improper and should be withdrawn.

Finally, the Examiner has objected to the drawings, claiming that the features of claim 30 must be shown or the feature cancelled from the claim.

It is not believed necessary to illustrate in a separate Figure that all of the part length rods have different lengths, since that concept is readily understood per se, or certainly with reference to Figures 3A-3F which illustrate several fuel bundles having part length rods of different respective lengths.

Moreover, claim 30 was approved in the prosecution of the original patent and the Examiner's determination there regarding this minor matter should be given deference here. However, in order to avoid new matter issues, applicants propose to amend the relevant text in Column 10 to refer to FIGS. 3B-3F as examples of representative partial length rods of different lengths, without adding a new Figure. In any event, cancellation of claim 30 is authorized if the Examiner does not agree with applicants' position that no new drawing is necessary.


It is respectfully submitted that claims 15, 16, 20, 22-44 and 107-109 are now in condition for immediate allowance, and early passage to issue is requested. In the event, however, any small matters remain outstanding, the Examiner is encouraged to telephone

JOHANSSON et al.  
Serial No. 09/659,377  
May 27, 2003

the undersigned prior to the issuance of any Final Rejection in order to expedite the prosecution of this application.

Respectfully submitted,

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741387-4262960

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

6P3641

In re Patent Application of

Atty Dkt. 1585-280

C# M#

JOHANSSON et al.

Group Art Unit: 3641

Serial No. 09/659,377

Examiner: Behrend

Filed: September 7, 2000

Date: May 27, 2003

Title: OPTIMIZED CRITICAL POINTS IN A FUEL BUNDLE WITH PART LENGTH RODS

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

**RESPONSE/AMENDMENT/LETTER**

This is a response/amendment/letter in the above-identified application and includes an attachment which is hereby incorporated by reference and the signature below serves as the signature to the attachment in the absence of any other signature thereon.

☒ **Correspondence Address Indication Form Attached.****Fees are attached as calculated below:**

Total effective claims after amendment 29 minus highest number  
previously paid for 29 (at least 20) = 0 x \$ 18.00 \$ 0.00

Independent claims after amendment 5 minus highest number  
previously paid for 6 (at least 3) = 0 x \$ 84.00 \$ 0.00

If proper multiple dependent claims now added for first time, add \$280.00 (ignore improper) \$ 0.00

Petition is hereby made to extend the current due date so as to cover the filing date of this  
paper and attachment(s) (\$110.00/1 month; \$410.00/2 months; \$930.00/3 months) \$ 0.00

Terminal disclaimer enclosed, add \$ 110.00 \$ 0.00

☐ First/second submission after Final Rejection pursuant to 37 CFR 1.129(a) (\$750.00) \$ 0.00

☐ Please enter the previously unentered, filed

☐ Submission attached

**Subtotal \$ 0.00**

If "small entity," then enter half (1/2) of subtotal and subtract -\$ 0.00

☐ Applicant claims "small entity" status. ☐ Statement filed herewith

Rule 56 Information Disclosure Statement Filing Fee (\$180.00) \$ 0.00

Assignment Recording Fee (\$40.00) \$ 0.00

Other: LETTER; Duplicate copy of instant Amendment to be placed in merged Reexamination Control No. 90/005,098 file) 0.00

**TOTAL FEE ENCLOSED \$ 0.00**

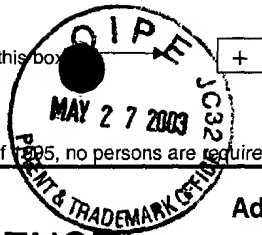
The Commissioner is hereby authorized to charge any deficiency, or credit any overpayment, in the fee(s) filed, or asserted to be filed, or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Account No. 14-1140. A duplicate copy of this sheet is attached.

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NIXON & VANDERHYE P.C.  
By Atty: Michael J. Keenan, Reg. No. 32,106

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PTO/SB/121 (10-00)

Approved for use through 10/31/2002. OMB 0651-0035

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Patent Number (if appropriate)	Application Number	Patent Date (if appropriate)	U.S. Filing Date
09/659,377	09/659,377		September 7, 2000

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Typed or Printed Name	Michael J. Keenan	(check one)  <input type="checkbox"/> Applicant or Patentee  <input type="checkbox"/> Assignee of record of the entire interest. Statement under 37 C.F.R. § 3.73(b) is enclosed. (Form PTO/SB/96)  <input checked="" type="checkbox"/> Attorney or Agent of record  32,106 (Reg. No.)
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